DEVELOPMENT OF LOW CALORIE *KALAM*: APPLICATION

ALTERNATIVES SWEETENERS AND FAT

A Synopsis for the degree of

DOCTOR OF PHILOSOPHY IN DAIRY SCIENCE

Submitted to

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मराठवाडा विद्यापीठ, नांदेड

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REASEARCH GUIDE

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January 2024

Ph. D Synopsis

Development of low-calorie *Kalam:* Application alternatives Sweeteners and Fats.

Introduction

The quantum shift in consumer preference, driven by increasing health consciousness and awareness of the nutritional benefits of dairy products is noteworthy.Recognized a vital source of essential nutrients such as calcium, protein and vitamins, dairy products have become integral part of everyday diets.The demand for value added dairy products has surged.The growth of organized retail chains and supermarkets has expanded consumers access to diverse range of dairy products. The dairy industry has embraced modern technologies to enhance product quality, safety and efficiency, leading to the production of high quality traditional dairy products (Minhas,2003): Dairy industry in India: Statistics and Facts.)

Kalam is the Pedha which are come under the category of heat decicated dairy products, popularly known as *Kalam.* It was invented by Prahlad Gyanba Kalamwale at Gangakhed, district Parbhani. The *Kalam* was famous for their taste and appearance but, now the Kalam was prepared by different peoples and marketed by the name of *Kalam.*It containing large amount of sugar and fat, which are directly affect on consumers health as diabetes, hypertension, dental careers, obesity, so we want to need prepare low calorie *Kalam* by using sugar substitute Stevia and fat substitute Polydextrose.Polydextrose has all functional and organoleptic properties of fat. It is proposed in the present investigation to optimize a process for preparation of *Kalam* from buffalo milk by utilizing various levels of Stevia and different proportions of Polydextrose with suitable quantities of sugar.The proposed study shall find out the formation which will be suitable for development low-calorie *Kalam.*

The traditionally prepared Kalam contains high number of calories and fat which is harmful to health of the consumers (Shinde S. *et al.* 2018) It is necessary to replace some amount Sugar and Fat into the final product which result to obtain low-calorie product. The taste, appearance, richness, flakiness, and sheen with significantly fewer calories than fat. (Warshaw *et al*. 1996). Sugar consumption is related to diabetes which inturn is related to many other diseases like

dental carries, obesity, diabetes, hypertension, hyperglycemia and heart disease etc.(Rao and Pagote,2018).

Stevia is a novel sweetness as it can be easily blended with different traditional sweeteners such as dextrose and maltodextrin (Katherine Marengo LDN Mc. Dermott, 2020).

The joint FAO/WHO committee on food additives status that Stevieol glycosides are safe for use in foodstuff and beverages. (JECFA,2018).The acceptable daily intake of 0.4 mg/kg body weight of steviol glycosides are suggested(Gardana C. *et* al.2010) Polydextrose (PDX) is an indigestible oligosaccharide used widely across many of the sectors of the food industry. Polydextrose is an easily soluble fiber.It has proven prebiotic potential, which can be used as partial fat replacer in dairy products.It can help reduce the calorie contents of these products while maintaining their texture and flavor (Mickova K. *et al*.2007).

Review and literature

Mahadevan, (1991) reported that the Pedha and Barfi are the two main Khoa based sweets which are highly popular among Indians due to their delicious taste and high nutritional value. Quantity of Pedha produced in India exceeds any other indigenous milk-based sweets.

Gibson and Roberfroid, (1995) recommended that the prebiotics are sometimes referred to as non-digestible oligosaccharides and fibers. The appropriate amount of polydextrose added in dairy products is 1-5%.

Tanaka and Nakanishi, (1996) reported that the, consumption of energy dense food having high sugar and higher fat along with sedentary lifestyle have paved way for non communicable disease like obesity, diabetes and cardiovascular disease.

Staley mfg.co. (1997) reported that the Polydextrose (PDX) is a bulking agent used to provide body and texture in reduced caloric foods. It is non crystalline powder that can be used to stabilize foods by preventing sugar and polyol crystallization.

Anonymous, (1998) Polylidextrose is water soluble randomly bonded bulk polymers with an average degree of polymerization of about to glucose.

Mickova,*et al*.(2007) reported that the determination of polydextrose in butter is complicated owing to a large excess of fat and to the presence of other compounds.

Pal and Raju(2007) reported that the traditional dairy products can contain high fat and high sugar.

Murphy,*et al.*(2008) the study reported that the use Stevia is an appealing alternative in order to reduce the calorie value of flavoured milk its primary importance to increases the acceptance of product by consumer while decreasing the Sugar contents.

Abdel, *etal.*(2009) reported that hot water extract of Stevia leaves was used to produce functional yogurt cake. There was reduction in calories by 35.72% as compared to regular yogurt cake.

Shah,*et al*.(2010) reported that decreases in energy value was noted when sucrose free chocolate where prepared with the addition of Stevia.

Gardana, *et al.*(2010) the joint FAO/WHO expert committee on food additives (JECFA 2008) stated that stevieol glycosides were safe for use in food stuff and beverages. JECFA also suggested the acceptable daily intake (ADI) of 0-0-4 mg/kg body weight of stevieol glycoside's which is equivalent to 0-10 mg/kg. Sativoside.

Lisak, *et al.*(2011) this study revealed that the yogurt is one of the best known food that contains probiotics. Sensory analysis of strawberry flavored yoghurt with Stevia elucidated that yogurt with a mixture of Stevia and sucrose had the best sensory profile.

Giri, *et. al.*(2012) reported that kulfi prepared with stevia showed decreases in calorific value, but a significant increase in fat, Ash, and protein contents due to decreases in total solids which resulted from partial replacement of Sugar with Stevia.

Giri*et. al.*(2012) the study reported that, the Kulfi prepared with addition of Stevia indicated maximum overall acceptability, where as no significant effect was observed on the body and texture and flavor of Kulfi. If the level of replacement of sugar with Stevia was less than 50%, however negative impact on the textural properties as well as flavors was observed when the level of sugar replacement with stevia exceed 50%.

Alizadeh,*et.al.*(2014) this study reported that reduction of glycemic index and caloric value was reported in ice cream prepared with Stevia. This is healthy alternative for people who are suffering from diabetes and obesity.

Ozdemir, *et.al.*(2015) reported that the natural low-calorie alternative to Sweettened dairy products, that would reduce the Sugar contents while maintaining the body and texture and mouthfeel. Stevia has emerged as a suitable choice for dairy products because it's suitability during heat treatment.The most popular Ice- cream their sweetness is sucrose because of its cost effectiveness and consumer acceptability, but its adversely affect on health, so now other sweeteners like Stevia are gaining popularity due to low calories health benefits. The study revealed that the ice-cream mixture in which sucrose had been partially replaced with Stevia had better sensory score those with Stevia only.

Gandhi,*et al.*(2018) reported that, in India the use of steviol glycosides was permitted by FSSAI in the notification issued in 2015, for a variety of products including yoghurt carbonated beverages, jams, fruits nectars, dairy based dessert ready to eat cereals etc.

Rao and Pagote (2018) recent studies revealed that out of every 12 urban Indians, above the age of 40, is liked to be diabetics by the year end 2025, the total number of peoples in the world with diabetes was projected to rise from 171 million (in 2020) to 366 million by 2030. India, China and United States are among the top three countries estimated to have the highest number of peoples with diabetes that is 31.7, 20.8 and 17.7 million respectively in 2002, which is expected to increases to 79.4, 42.3 and 30.3 million respectively in 2030 India is home to world second largest diabetic population after China. India has 5.1 crores diabetic persons, expected to touch 8 crores by 2030, about 21% peoples in Bangalore have one form or the other diabetes, similarly if we see the condition of obese patients. In India 15% population come under obesity list. This information to be consider for development of low calories low sugar dairy products for population.

Shinde*, et. al.*(2018) reported that the Kalam prepared from buffalo milk containing 3% fat without incorporation of fat replacer was unacceptable in terms of sensory attributes because prepared *Kalam* was hard and chewy, so need to add maltodextrin as fat substitute.

Objectives of Research

1) To study the standardize preparation process of *Kalam.*
2) Exploring stevia as low calories sweeteners in *Kalam.*
3) To study the replacement of fat with Polydextrose.
4) To study the development of low calorie, low sugar *kalam.*
5) To estimate the cost of *Kalam* production

Methodology to be adopted

Traditional method of *Kalam* preparation is that containing 6% buffalo milk fat,30 % Sugar having high number of calories, its adversely affect on health.Preparation of low calories *Kalam* containing3 % buffalo milk with low sugar 1-3%Polydextrose(fat replacer)and Stevia (sugar substitute)@ 0.4-1 gm/ kg body weight.Low calorie *Kalam* compared with traditional *Kalam* on the basis of sensory, glycemic index, body and texture evaluation. Obtained data shall be expressed as mean± standard deviation of mean& shall calculate three independent experiments. one way analysis of variance (ANOVA) using Completely RandomizedDesign(CRD) shall be applied.

Importance of study

The traditional *Kalam* prepared by using high sugar with high calories, which causes obesity,diabetes, hypertension, hypoglycemia to the consumers, so we want to need to develop low calorie *Kalam*, their importance are peoples to reduce obesity, hypertension, diabetesdental carries and improve digestive health.

National status

The consumption of traditional dairy products is higher than the other dairy products.The annual growth rate of this product is more than 20% In India, while the growth rate for western dairy products is relatively much lower(5-10%).The high sugar content in dairy products poses severe restrictions on its consumption and hence the use of sweeteners instead of sugar is preferred.Among the sweeteners three is more demand for natural sweetenersas compared to artificial sweeteners stevia.Natural sweeteners are used large amount in western dairy and food products but, its market is expanding rapidly in India.

International status

The global rate of stevia is estimated to exceed $ 1 billion by 2021 based on current market trends. The high-quality stevia was approved to use mostly in fermented dairy product.The importance of stevia used in dairy and food products for their characteristics which have low calorie products.

Proposed work plan

First year: -Collection of references, survey, visit to Gangakhed where *Kalam* actually prepared, visit to agriculture University, College of dairy technology etc.

Second year: -Preparation of *Kalam* and evaluation as sensory, chemical, and microbiological study.

Third year: -Interpretation of data and thesis writing.

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